# Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

Subject: INFORMATION: Policy Statement on Corded Electrical Devices Used in the Passenger Cabin

Date: November 21, 2002

From: Acting Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM-100

Reply to Attn. of: 02-115-20

To: See Distribution

Regulatory Reference: §§ 25.601, 25.813(a) and (c), 25.815, AC 25-17, Policy Memorandums dated Nov. 25, 1994, and April 8, 1995

The purpose of this memorandum is to consolidate and clarify Federal Aviation Administration (FAA) certification policy with respect to addressing potential hazards associated with the installation of corded electrical devices used in the passenger cabin. Examples of corded electrical devices are telephone handsets and video system controllers. This guidance supersedes the previously published guidance, reference memorandums dated November 25, 1994, and April 8, 1995.

**Current Regulatory and Advisory Material**

Section 25.601 requires that the airplane not have design features or details that experience has shown to be hazardous or unreliable.

Section 25.813(a) requires an unobstructed passageway leading from the main aisle to each Type A, Type B, Type C, Type I or Type II emergency exits and between individual passenger areas and, if two or more main aisles are provided, unobstructed cross-aisles between main aisles.

Section 25.813(c) requires access from the nearest aisle to each Type III or Type IV exit and, for airplanes that have a passenger seating configuration of 60 or more, an unobstructed passageway that leads to these exits.

Section 25.815 specifies required passenger aisle widths. Advisory Circular (AC) 25-17, paragraph 441b(2) states, in pertinent part, "The effect of the protuberance on evacuation of the airplane should be considered when determining if it may or may not protrude into the required aisle width."

The Transport Airplane Directorate (TAD) issued the November 25, 1994, policy memorandum entitled "Certification of Telephone Units in Seat Backs or on Partitions Intended for Use by Passengers in the Seat Rows Immediately Adjacent to the Seats" in response to comments from parties involved with the production and installation of air telephones in the backs of seats installed on transport category airplanes. The parties

expressed concern that different manufacturers were being held to different criteria in order to get their systems certificated. In an effort to ensure that a "level playing field" existed for all applicants, the TAD obtained information from various aircraft certification offices and other FAA organizations and issued the November 25, 1994, policy memorandum. That policy memorandum identified the following criteria to be considered in regard to the electrical device's cord:

a. The cord length should be limited so as not to allow the corded device to be passed to anyone sitting across the passenger aisle from the seatback with the unit installed, or to be used by anyone sitting in the seat row behind the user's seat row. Conduct an evaluation to ensure that an unstowed cord does not become a hazard which can entrap or snag limbs or clothing during an emergency evacuation.

b. Placards should be installed which state what action is to be taken if a cord fails to retract properly, and, as applicable, how to activate the retraction mechanism when a cord clutch system is installed.

c. Corded devices should not be installed on or in the surface of any seat or partition bordering the passageway to any emergency exit.

The FAA received a significant numbers of responses to portions of the guidance provided in the November 25, 1994, memorandum. As a result the TAD issued an additional FAA policy memorandum, dated April 8, 1995, entitled "Follow-up to November 25, 1994, Memorandum on the Certification of Telephone Units." This memorandum provided the option of requiring corded devices to be stowed for taxi, takeoff and landing or, alternatively, of meeting all the criteria of the November 25, 1994, memorandum. The April 8, 1995, memorandum rescinded certain aspects of the November 25, 1994, memorandum provided that the phone system was restricted from use during taxi, takeoff and landing.

This guidance was intended to be used only temporarily until new guidance could be developed. The issues were referred to a Society of Automotive Engineers (SAE) S-9 Committee which was to develop industry-wide standards. The FAA would then consider the industry standard for adoption into official guidance. If new guidance was not so developed, the FAA would issue new guidance with an implementation goal of February 1997. The SAE S-9 Committee eventually developed a draft document containing general recommendations. But the document did not provide information that could be translated into a guidance document, and was never approved by the Aerospace Council.

In addition to the policy related to cords, policy was also provided on head strike considerations (applicable to units installed in seat backs and intended for use by passengers seated in the row aft) and placarding. Those issues will be addressed later in this memorandum.

**The New Policy**

The policy contained herein is intended to provide the applicant with various certification options, which will require little or no on-aircraft evaluation of cord devices, provided that these devices meet certain basic criteria. This policy is applicable to typical commercial air carrier passenger configurations, i.e., 14 CFR part 121 and part 135 operations.

The cordreels used for corded device installations must be of sufficient quality and design that they reliably retract. The reliability of the cord reels should be established by the manufacturer, e.g., lifecycle testing, or analysis supported by testing. The data or analysis with supporting data should be made available upon request. The constant tension cordreel should be tested to show that it can be extended and retracted for its service life without a degradation in its performance. In addition to the extension testing, the ratcheting cordreel should also be tested to show that the ratcheting mechanism will perform reliably for its projected service life. The same basic philosophy applies to coiled cords as well.

The following guidelines apply: (See process flow chart below.)

a. If the device is not intended for use during taxi, takeoff and landing (TT&L), and is restricted accordingly, e.g., by appropriate placarding, then no cord length and no cord loop evaluations are required.

b. If the device is intended for use during TT&L, and it has a constant tension cord, then no cord length and no cord loop evaluations are required.

c. If the device is intended for use during TT&L, and it does not have a constant tension cord and it is not installed on an aisle, cross aisle or exit row, then no cord loop and length evaluation is required.

d. If, however, the device is intended for use during TT&L, and does not have a constant tension cord, and is installed on an aisle armrest, a cross aisle armrest or aisle side seatback or in an exit row, then cord loop and length evaluations must be made to ensure that the corded device will not interfere with passenger emergency egress. These devices may include breakaway capabilities in the cord connections, or frangibility in the cord itself, that can act as compensating features during the evaluation.

The following cord loop and length evaluations should be made for devices identified in (d) above:

**Cord Loop Evaluation.** Loops created by mis-stowage of a corded device should be evaluated to determine if they pose an egress hazard. It should be shown that, with the handset stowed in its cradle, an unstowed cord does not become a hazard which can entrap or snag limbs or clothing during an emergency evacuation. Evaluations should be made with a $5^{th}$ percentile female and a $95^{th}$ percentile male, as follows:

a. Any cord loop that can be formed by mis-stowing the handset using reasonable force should be evaluated to determine that the location of the loop does not pose an egress hazard. Loops formed below the level of the armrest and contained within the bounds of the seat bottom cushion should be acceptable.

b. Any loop that can be formed by mis-stowing the handset using reasonable force, which extends into an aisle, must be unable to encircle an appendage (limb or clothing) without significant manipulation or contrivance.

c. Any loop that can be formed by mis-stowing the handset using reasonable force, in a location where a limb may be encircled, must be easily escapable by normal passenger movement, or the handset must be able to be pulled free with normal motion and strength.

**Cord Length.** Applicants must demonstrate that their handset installation cord length will not permit the handset to lie flat on the floor when the handset is not properly stowed. Also, on seat back mounted handsets, the cord length must be restricted so that the device cannot be used by anyone seated across the aisle or by anyone seated in a row behind the row directly facing the unit. Note: This does not preclude the passing of the handset forward to the row on which the handset is mounted.

**Passenger Injuries and Head Strike Considerations.** Regardless of handset usage for TT&L or the cord retraction mechanism type, all installations within the passenger head strike arc must exhibit acceptable head strike characteristic, i.e., § 25.562(a) and § 25.785(d)(2), Amendment 25-72, or § 25.785(c)(2), Amendment 25-71. If they fail to meet acceptable norms, they must be redesigned as appropriate.

The telephone handset installation should not contain any pointed corners or sharp edges that can be touched or struck within the passenger head strike arc. Additionally, it is important to ensure that a seat back with a telephone complies with § 25.785(b), i.e., a passenger's head striking the telephone under the minor crash conditions appropriate for the type certification basis of the airplane in which the telephone is installed will not suffer a serious injury.

For handset installations in airplanes which do not have § 25.562, Amendment 25-64, in their type certification basis, it would be sufficient to show that the telephone installation does not make it more hazardous to strike the seat back. This can be shown by using the bowling ball test described in AC 25-17, Transport Airplane Cabin Interiors Crashworthiness Handbook, for doing comparison tests of the seat back with and without the telephone installed. As noted in a memorandum from ANM-100, dated July 13, 1994, testing done at the Civil Aeromedical Institute (CAMI) indicates that the bowling ball test should not be used as an absolute pass-or-fail test for passenger head strike. In the case of the plain seat back, the ball should be dropped on a typical hard surface within the head strike area, such as the top of the food tray. If the telephone installation rebound energy and deceleration are essentially equal to or lower than the plain seat back, the installation would be acceptable. The weight of the ball used in these comparison tests should be approximately 13 pounds, as noted in the previously referenced (July 1994) memorandum.

An alternative approach to the bowling ball test is to show that the telephone handset is located outside the head strike arc of the passenger. When this approach is used between seat rows, it is usually based on the forward seat back breaking over, so that the passenger's head misses the telephone. In this case, consideration must be given to the breakover features. Many new seat designs intended to pass the new dynamic seat test requirements (but not necessarily found to be in compliance with §25.562(c)(5)) have restricted or locked-out seat back breakover. Additionally, seat backs on seats bordering the passageway to an exit may also have limited or no breakover. This limitation may impact the ability of the seat back to move out of the way of the passenger. If the telephone handset is mounted on a partition, the telephone should be shown

to be entirely outside the 35-inch passenger head strike arc discussed in paragraph 81b(3) of AC 25-17.

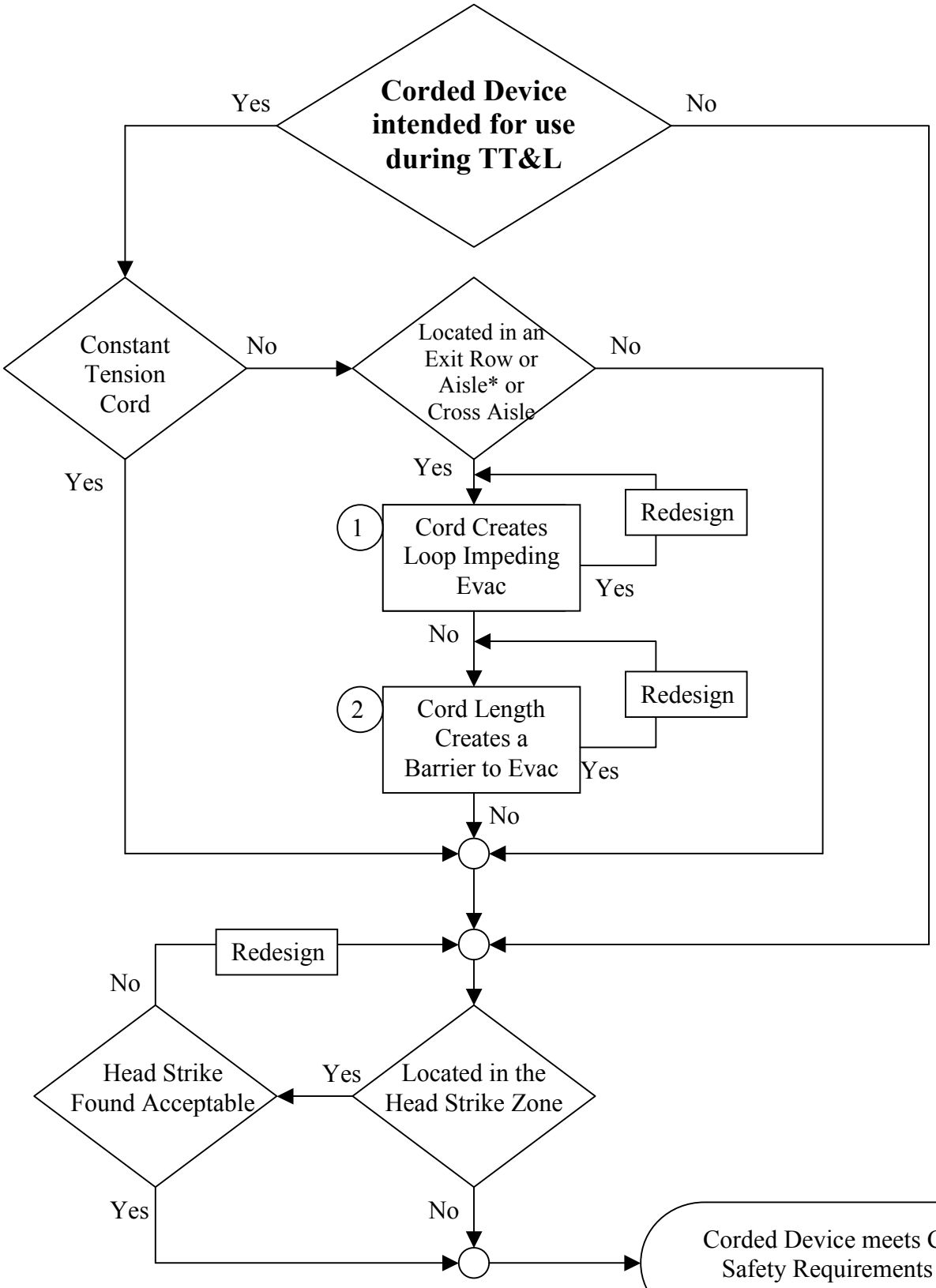
For installations in airplanes which have § 25.562, Amendment 25-64, in their type certification basis, the required level of performance is the measurement of the head injury criterion (HIC) described in § 25.562(c)(5). The HIC would also be an acceptable alternative to the comparative bowling ball test for the installations discussed in the previous paragraph. To show that the telephone handset installation is outside the head strike arc of the passenger, the arc generated by the dummy used in the HIC test, extrapolated to a 95th percentile male, is satisfactory.

Irrespective of the type certification basis of the airplane, the tests noted above must take into account whether or not the telephone handsets are allowed to be used during takeoff and landing. If the telephone system is intended to be used during those phases of flight, the tests must be conducted with the handset removed from the holder, in addition to tests with the handset installed. If satisfactory results cannot be achieved with the handset removed, the system should not be allowed to be operated during takeoff and landing.

**Associated Placards:** If placards are installed which state when a handset may (or may not) be used, at least one placard should be in plain sight of the occupant of any position from which the handset is likely to be used, whether or not the handset is stowed. These, and any other safety related placards, should be of sufficient size and color contrast (lettering to background) so as to be easily visible to all expected users under normal cabin lighting conditions. Visibility during low light level conditions, which are often encountered during night flights, is desirable, but not mandatory.

Finally, this guidance material covers compliance for cabin safety issues only. All other applicable certification regulations still apply.

# CORDED DEVICES




* Aisle location - mounted on either the seatback or the armrest

** This process only covers compliance for Cabin Safety regulations, all other applicable regulations still apply.

**Effect of Policy**

The general policy stated in this document does not constitute a new regulation or create what the courts refer to as a "binding norm." The office that implements policy should follow this policy when applicable to the specific project. Whenever an applicant's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office, e.g., through the issue paper process or equivalent.

Applicants should expect that the certificating officials will consider this information when making findings of compliance relevant to new certificate actions. Also, as with all advisory material, this policy statement identifies one means, but not the only means, of compliance.

Any questions may be directed to Alan Sinclair, ANM-115, at (425) 227-2195.

/s/

Ali Bahrami

| | DISPOSITION OF PUBLIC COMMENTS ON DRAFT POLICY STATEMENT 02-115-20, CORDED ELECTRICAL DEVICES | |
|---|---|---|
| **Commenter** | **Comment** | **Disposition** |
| General Aviation Manufacturers Association (GAMA) | Passenger Injuries and Head Strike Consideration<br>Per the ARAC agreements regarding installations in airplanes which do not have Amendment 25-64 in their type certification basis, it was decided that seatback mounted items weighing less than 3 pounds would not require additional assessment for blunt trauma. As mentioned in the memo, they would have to be properly designed to ensure that no sharp edges or corners are exposed to the occupant seated behind the seat back. This option should be added to the Policy Statement. | This Policy Memo establishes an a compliance, but not the only mean |
| Cessna Aircraft Company | It is Cessna's belief that the Policy Statement No. ANM-02-115-02, Corded Electrical Devices, should only be applicable to Part 25 certificated aircraft with a passenger capacity more than 19. | The statement has been added "… typical commercial air carrier pass configurations, i.e., 14 CFR part 12 operations." |
| Matsushita Avionics System Corp. (MAS) | In the section titled "New Policy," the 2nd sentence of the 2nd paragraph should read. "The reliability of the cord reels should be established by the manufacturer, and the data made available on request." | The sentence has been revised as f reliability of the cord reels should the manufacture, e.g., lifecycle test supported by testing. The data or a supporting data should be made av request." |
| MAS | In the section titled "New Policy," in both paragraphs (a) and (b) should read in part. "…then no cord length and no cord loop evaluations are required." | The paragraph has been revised. |
| MAS | In the section titled "New Policy," in paragraph (a) should read in part. "If the devise is not intended for use during [TT&L], and is placarded against such use or is appropriately restricted in the AFM(S),…" | Do not concur, the AFM is not inte this type of cabin amenity, per AC placard is the appropriate method c use of the device. |
| MAS | In the section titled "New Policy," in paragraph (c) should read in part. "…and it is not installed on an aisle, cross aisle, or exit row…" | The paragraph has been revised. |
| MAS | In the section titled "New Policy," in paragraph (d) should read in part. "…and is installed on an aisle armrest, cross aisle armrest, aisle side seatback or in an exit row,…" | The paragraph has been revised. |
| MAS | In the section titled "Cord Length," the last sentence should read. "Also, on seat back mounted handsets, the cord length must be restricted so that the device cannot be used by anyone seated across the aisle or by anyone seated in a row behind that immediately facing the unit. Note: This does not preclude the passing of the handset forward to the row on which the handset is mounted." | The sentence has been revised. |

| | DISPOSITION OF PUBLIC COMMENTS ON DRAFT POLICY STATEMENT 02-115-20, CORDED ELECTRICAL DEVICES | |
|---|---|---|
| **Commenter** | **Comment** | **Disposition** |
| MAS | In the section titled "Passenger Injuries and Head Strike Considerations" the first sentence should read in part. "… head strike characteristic, i.e., § 25.562(a) and § 25.785(d)(2) Amendment 25-72 or § 25.785(c)(2) for aircraft prior to Amendment 25-72. | The sentence has been revised as fo 25.562(a) and § 25.785(d)(2), Ame § 25.785(c)(2), Amendment 25-71 |
| MAS | In the section titled "Passenger Injuries and Head Strike Considerations" the first sentence of both paragraphs 3 and 5 should read in part. "… have FAR 25.562 Amendment 25-64 in their type certification basis…" | Both paragraphs have been revised § 25.562, Amendment 25-64, in th certification basis |
| MAS | In the section titled "Associated Placards" delete the first sentence. | The sentence has been deleted. |
| MAS | In the section titled "Associated Placards" the third sentence should read. "If in lieu of the appropriate restrictions in the AFM(S) to non-use during, TT&L, placards are installed which state when handset may (or may not) be used, at least one placard should be in plain sight of the occupant of any position from which the handset is likely to be used, whether or not the handset is stowed . | Do not concur, the AFM is not inte this type of cabin amenity, per AC placard is the appropriate method c use of the device. The sentence ha follows. "If placards are installed handset may (or may not) be used, placard should be in plain sight of any position from which the hands used, whether or not the handset is |
| Boeing | Page 1, first paragraph: Add the following. "This guidance also supersedes the previously published letter dated May 21, 1999." | The letter was issued by the Seattle Certification Office to Boeing and and will not be addressed . |
| Boeing | Page 3 paragraph 2: Delete the second sentence, which states " The reliability of the cord reels should be shown by lifecycle testing. | The FAA does not agree with delet however, it has been rewritten as fo reliability of the cord reels should the manufacturer, e.g., lifestyle tes supported by testing. The data or a supporting data should be made av request. |
| Boeing | Page 3 paragraph 3 in both Items a. and b. should read in part. "…then no cord loop and length evaluation is required." | The paragraph has been revised. . length and no cord loop evaluation |
| Boeing | Page 3 paragraph 3 in Items a should read in part "…and is restricted appropriately…" | The sentence has been revised as fo restricted according, e.g., by appro placarding…" |
| Boeing | Page 4, paragraph 3, Item c. should read in part "… tension cord and it is not installed on an aisle, cross aisle or exit row…" | The sentence has been revised. |

| | DISPOSITION OF PUBLIC COMMENTS ON DRAFT POLICY STATEMENT 02-115-20, CORDED ELECTRICAL DEVICES | |
|---|---|---|
| **Commenter** | **Comment** | **Disposition** |
| Boeing | Page 3, paragraph 3 Item d. should read in part "If, however, the device is intended for use during TT&L, and does not have a constant tension cord, and is installed on an aisle armrest, a cross aisle armrest or aisle side seatback…" | The sentence has been revised. |
| Boeing | Page 4, paragraph 2 and the last paragraph, in section "Passenger Injuries and Head Strike Considerations" the first sentence should read in part. "…have 14 CFR § 25.562 Amendment 25-64 in their type certification basis…" | The sentence has been revised as f § 25.562, Amendment 25-64, in th certification basis…" |
| Boeing | Page 5, paragraph 2, "Associated Placards" Delete the entire paragraph | Do not concur, the AFM is not inte this type of cabin amenity, per AC Placards are the appropriate metho use of the device. |
| Boeing | Page 6, "Corded Devices" flow chart: Add the following information to the flow chart: If a modification (in production or post-production) to an existing certified interior configuration that includes corded devices is being done, and all of the following condition exist, then the cord devices do not need to be evaluated to the criteria in the policy memo, unless the design is as defined in Item d on page 3:<br>There is no change to the seat part number; and<br>There is no change to the IFE or telephone handset; and<br>There is no change to the cord, cord reel equipment, or cradle: and<br>There is no change to the installation of the handset / cord reel / or cradle in the seat. | It is the intend of this Policy to eva configurations being installed eithe a production certificate. |
| Boeing | Page 6, "Corded Devices" flow chart: Change the phrase in the diamond block that states " Located in an Exit Row or Aisle*" to state the following " Located in an Exit Row or Aisle* or Cross Aisle" | The statement has been revised. |